

$$\begin{aligned}
 7. \quad 2xy^2 + 3\ln y &= x^2 - 3y^3 & \frac{dy}{dx} \Big|_{(3,1)} &= ? \\
 2x \cdot 2y \cdot y' + y^3 \cdot 2 + 3 \cdot \frac{1}{y} \cdot y' &= 2x - 9y^2 \cdot y' \\
 4xy y' + \frac{3}{y} y' + 9y^2 y' &= 2x - 2y^2 \\
 y' \left( 4xy + \frac{3}{y} + 9y^2 \right) &= \frac{2x - 2y^2}{4xy + \frac{3}{y} + 9y^2} \Big|_{(3,1)} = \frac{1}{6}
 \end{aligned}$$

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$$\begin{aligned}
 13. \quad a(t) &= 2t - 3 & v_0 &= -4 & 0 \leq t \leq 5 \\
 & & & & \text{when farthest left}
 \end{aligned}$$

$$\begin{aligned}
 v(t) &= \int 2t - 3 \, dt \\
 &= t^2 - 3t + C
 \end{aligned}$$

$$i.c. \quad -4 = C$$

$$\begin{aligned}
 v(t) &= t^2 - 3t - 4 = 0 \\
 &= (t+1)(t-4) = 0 \\
 t &= -1 \text{ or } t = 4
 \end{aligned}$$

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Review 9  $f, f', f''$

$f' > 0$   $f$  increases

$f' < 0$   $f$  decreases

$f' = 0$  level: max or min or flat pt  
 $f'$   $+0-$   $-0+$   $+0+$  or  $-0-$   
 $+*-$   $-*+$

$f'' > 0$   $f$  concave up 

$f'' < 0$   $f$  concave down 

Inflection pts:  $f''$  changes sign  
 $f''$ :  $+0-$  or  $-0+$

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